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REVISION OF THE SPECIES OF PYROPYGA (LAMPYRIDAE)

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The genera of the lampyrid series from *Lucidota* to *Photinus* are mutually very similar in their external anatomy. Motschulsky (1853) described a considerable number of these that were subsequently suppressed as synonyms by Olivier. Motschulsky's descriptions were not satisfactory, being based primarily on the light organs, with which he apparently included all pale areas of the ventral abdominal surface. Fortunately he designated a type species for each genus. One of these, *Pyropyga*, is the subject of the present discussion.

LeConte recognized *Pyropyga* as a valid genus, but he included therein a mixture of generic types. After removing these misfits, there remain four specific names cited by LeConte that are properly assignable to *Pyropyga*, namely, *nigricans* Say, *fenestralis* Melsheimer, *decipiens* Harris, and *minuta* LeConte. Another species, *P. incognita* E. Olivier, occurs in the West Indies. Motschulsky designated *P. nigricans* Say as the type of his genus, and added as additional species *P. californica* Motschulsky and *P. tarda* Motschulsky. The latter, from Brazil, is unknown to the author. The type species has remained more or less unknown, but a study of Say's description points conclusively to its identity with *P. fenestralis*, Say's name having priority. This synonymy was suggested to the author some years ago by the late H. S. Barber, an authority on the Lampyridae. Gorham's description of *Lucidota extincta* (1880:17), from Guatemala, apparently applies to a species of *Pyropyga*. Since his type specimen was a female and therefore unidentifiable, it must be regarded for the present as a species indeterminata. In the *Biologia* (1881:48) Gorham placed his species in the genus *Photinus*, and added additional material from Mexico, undoubtedly a species mixture.

A random check of the male genitalia of an assortment of Neotropical *Photinini* revealed a gratifying diversity of structure that undoubtedly will supply the key to their generic segregation. The male genitalia of *Pyropyga* are of a unique type, interpreted in the following manner. All the exterior parts are closely united to form a subtubulate tegmen, with the distal section of the median lobe, and subapical processes of the lateral lobes, free. Two species categories are indicated according as the lateral lobes are each provided with an outer and an inner process, or with the outer

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process only. The prominent outer process arises near the tip of the lateral lobe and extends forward usually somewhat beyond the tip of the median lobe. The inner process is small and concealed laterally by the outer process, but it is visible, in part at least, from a ventral viewpoint. These processes arise at the origin of the outer processes, and extend forward as far as, or farther than, the apices of the lateral lobes, but on a lower level. The tips of the inner processes are inflexed, and are either in contact with each other or with the lower edge of the median lobe. From a dorsal viewpoint, the lateral lobes, excluding the processes, usually embrace the base of the free part of the median lobe, which hereinafter will be designated simply the median lobe. An exception to this formation occurs in *P. incognita*, where the lateral lobes unite and cover the base of the median lobe. A considerable amount of variability is evident in the genitalia, and this is especially true of the two most widely distributed species, *P. minuta* and *P. nigricans*. It is possible that these two species are complexes that will eventually be divided. No correlation has been noted, however, between genitalic variations and geographic habitat or any external characteristics.

In all the known species of *Pyropyga* the body, except the prothorax, is entirely black or dark piceous. The pronotum is pale flavate, often with a rosy tinge, and is provided with a sharply defined median vitta roughly one-third to one-half the pronotal width. The vitta extends usually from apex to base, where it is often somewhat abruptly expanded. In *P. nigricans* the pronotum is also normally completely bordered with black, while in *P. decipiens* the entire pronotum may be dark. In both these species, however, the pronotum may be pale with only the median vitta dark. In *P. alticola* the vitta is expanded to cover nearly all of the convex median area.

This study was based largely on the collection of the California Academy of Sciences. Additional material of great value was received from the following institutions and individuals, to whom the author expresses his sincere thanks and appreciation. The abbreviations in parentheses are used in the text to indicate the present location of certain specimens.

(AMNH) American Museum of Natural History, Mont A. Cazier, Marjorie Statham.

(CU) Cornell University, Henry Dietrich.

(OSU) Ohio State University, J. N. Knull.

(UCal) University of California at Berkeley, P. D. Hurd, Jerry Powell.

(UKans) University of Kansas, G. W. Byers.

(UMich) University of Michigan, T. E. Moore.

F. A. McDermott.

Pyropyga Motschulsky

Pyropyga Motschulsky, 1852, Etudes entomologiques, Helsingfors, p. 28.

Any generic description of *Pyropyga* will necessarily be inadequate, inasmuch as related genera are at present unrecognized and proper distinguishing characters cannot be given. Both sexes alate, non-luminous. Body texture soft; form elongate-oval, parallel-sided; size small, length 3-8.5

mm. Color black or dark piceous, pronotum pale with median vitta, sometimes also with dark borders, rarely entirely dark. Antennae similar in the sexes, about half as long as the body, rather slender, compressed, segments from third parallel-sided; vestiture fine, short, decumbent. Eyes small, distant. Clypeus subconnate with front, suture evident. Palpi as usual, maxillary massive, terminal segment of labial securiform. Prosternum emarginate in front. Elytra with dual pubescence, the secondary absent basally; epipleurae narrow. Legs short, tarsal claws simple. Male with pygidium broadly rounded or subtruncate at apex, ventral segment 8 arcuately emarginate; genitalia of the unique type described in a preceding paragraph.

KEY TO MALES OF PYROPYGA

1. Lateral lobes of genitalia with both outer and inner processes ----- 2
Lateral lobes without inner processes----- 8
2. Median lobe of genitalia, viewed laterally, with lower margin sinuate near tip ----- 3
Median lobe not as above ----- 5
3. Pronotum normally with distinct black borders, these sometimes faint, rarely lacking.
Median lobe of genitalia, viewed dorsally, broader at base, basal angles nearly right ----- (1) *Pyropyga nigricans* (Say)
Pronotum normally without dark borders, sometimes faintly indicated. Median lobe narrower at base, basal angles strongly obtuse----- 4
4. Median lobe of genitalia not extending beyond tips of outer processes -----
----- (2) *Pyropyga modesta* Green, new species
Median lobe extending beyond tips of outer processes-----
----- (3) *Pyropyga cordobana* Green, new species
5. Tips of lateral lobes of genitalia greatly produced, nearly meeting tips of inner processes (Argentina) ----- (4) *Pyropyga australis* Green, new species
Tips of lateral lobes not produced (North America)----- 6
6. Median lobe of genitalia broad, viewed laterally, not arcuately deflexed -----
----- (5) *Pyropyga extensa* Green, new species
Median lobe narrow, arcuately deflexed between outer processes----- 7
7. Size smaller, less than 6 mm. in length. Pronotal vitta narrower, parallel-sided, expanded only near base----- (6) *Pyropyga minuta* (LeConte)
Size larger, 6 mm. or more in length. Pronotal vitta expanded to cover nearly all of convex surface, subparabolic, widening from apex to base -----
----- (7) *Pyropyga alticola* Green, new species
8. Lateral lobes of genitalia, viewed dorsally, united over base of median lobe (British West Indies, Venezuela)----- (8) *Pyropyga incognita* E. Olivier
Lateral lobes normal, separated by base of median lobe (North America)----- 9
9. Outer processes of genitalia, viewed ventrally, abruptly narrowed basally. Color pattern of pronotum variable (NE. United States, SE. Canada)---- (9) *Pyropyga decipiens* (Harris)
Outer processes not as above. Pronotum with median vitta only (Argentina)-----
----- (10) *Pyropyga saltensis* Green, new species

Species indeterminata

Pyropyga tarda Motschulsky, 1853, Etudes Entom., p. 4.

Lucidota extincta Gorham, 1880, Ent. Soc. London, Trans., p. 17.

In seven of the ten species of *Pyropyga* recognized herein, the male genitalia provide the only positive means of identification. Females must remain unidentified, or at best they may be tentatively placed through association in the field with the males. Detailed species descriptions would be completely useless. Differences in the relative length and width of pronotum and elytra occur, but the usual lampyrid variability in this respect nullifies its value as a taxonomic feature.

(1) *Pyropyga nigricans* (Say)

Lampyris nigricans Say, 1823, Acad. Nat. Sci. Philadelphia, Jour., 3: 179.

Pyratomena fenestralis Melsheimer, 1846, Acad. Nat. Sci. Philadelphia, Proc., 2: 304 (new synonymy).

Pyropyga californica Motschulsky, 1853, Etudes Entom., Helsingfors, p. 5.

Photinus reversus Gemminger, 1870, Coleop. Hefte, 6: 120.

Lucidota californica Gorham, 1880, Ent. Soc. London, Trans., p. 17.

Photinus sobrinus Gorham, 1881, Biol. Centrali-Amer., Coleop. 3, part 2, p. 49.

Body black or dark piceous, except pronotum pale with median vitta and entire border black, varying with borders only faintly darker, or not at all. Genitalia as in figure 1, inner processes present; viewed dorsally, median lobe broader as compared to two following species, basal angles nearly right. Length 4.25-8.5 mm.

Motschulsky designated this as the type species of the genus. Say's description unquestionably applies to the species subsequently named *fenestralis* by Melsheimer, which is now reduced to synonymy. The genitalia are confusingly variable, but always the median lobe, viewed dorsally, is quite wide at base with the basal angles nearly right. The median lobe in the two following related species is distinctly narrower with the basal angles strongly obtuse. The dorso-ventral outline varies from a normal elongate-oval to subtriangular or subrhombic. The lower margin of each outer process is slightly expanded and inflexed for a short distance beginning beyond the tip of the inner process, and possibly acting as a guide or stop limiting deflection of the median lobe. Such a structure occurs frequently in the Lampyrinae. It is not shown in the drawings but may be seen from a somewhat diagonally dorsal viewpoint. It is extremely variable in its development.

The pronotum of *P. nigricans* is usually completely bordered with black, in addition to the median vitta. The dark border varies to narrow and paler or indistinct, especially in specimens from Arizona. Complete elimination of the dark border is rare, but has been noted in a series from Corpus Christi, Texas.

In the females the terminal ventral segment of the abdomen is angulately notched at apex. The two preceding segments usually have a more or less distinct angulate notch at the middle of the apical margin, which is sinuate each side. It cannot be stated that this is a unique feature of *P. nigricans* because of the impossibility of identifying females of most of the other species.

In an interesting series collected by Peter Rubtzov at Pitkin Marsh in Sonoma County, California, the elytra in both sexes are definitely shortened, exposing several abdominal segments. In another series, collected by the author on the shores of Lake Champlain, near Plattsburg, New York, the same incipient brachyptery is evident in the females but not in the males. Possibly this phenomenon is associated with permanent moisture.

DISTRIBUTION.—The range of this species includes all but the southeastern section of the United States. It is rather uncommon east of the Mississippi River, and apparently very abundant from the Rocky Mountains to the Pacific Coast. It is known also from British Columbia and Saskatchewan; and in Mexico from Baja California, Chihuahua, Sinaloa, Durango, Nayarit, Michoacan, Aguascalientes, Hidalgo, and Puebla.

(2) *Pyropyga modesta* Green, NEW SPECIES

HOLOTYPE.—MALE. Roaring River State Park, Missouri, VI-15-54, J. W. Green. In collection of California Academy of Sciences.

Body black, pronotum pale with median vitta. Genitalia as in figure 2, inner processes present; viewed dorsally, median lobe narrower as compared to *P. nigricans*, with basal angles strongly obtuse; median lobe not extending beyond tips of outer processes. Length 7.25 mm.

VARIATIONS.—In an occasional specimen from Arizona the pronotal borders are narrowly infuscate, never deep black as in *P. nigricans*. In one example, from Devils River, Texas, the pronotal vitta is partially obliterated. Length 5-7.25 mm.

DISTRIBUTION.—UNITED STATES.—MISSOURI. Roaring River St. Park, VI-15-54, J. W. Green, holotype, 1 paratype (CAS). OKLAHOMA. Grandfield, VII-5-37, Standish-Kaiser, 1 paratype (CAS). Murray County, V-15-32, J. Smith, 1 paratype (CAS). TEXAS. Devils River, VII-27, J. W. Green, 2 paratypes (CAS). Edna, VIII-8-28, R. H. Beamer, 2 paratypes (UKans). Del Rio, VII-8-38, R. I. Sailer, 2 paratypes (UKans). Christoval, Tom Greene County, VI-29-48, C. & P. Vaurie, 1 paratype (AMNH). NEW MEXICO. Nogol Cn., Lincoln County, VI-23-21, C. D. Duncan, 1 paratype (CAS). ARIZONA. Oak Creek Canyon: VI-6-40, G. E. Bohart, 1 paratype (CAS); VII-9-41, E. L. Todd, 1 paratype (UKans); VI-26-50, J. G. Rosen, 1 paratype (UKans); VI-28-50, L. D. Beamer, 1 paratype (UKans). Chiricahua Mts.: VII-24-55, D. J. & J. N. Knull, 15 paratypes, 17 females (OSU); VII-3-47, L. D. Beamer, 1 paratype, 1 female (UKans); VII-4-40, D. E. Hardy, 1 paratype (UKans); SW. Research Station, VII-27-55, P. D. Hurd, 1 paratype, 2 females, 1 pair in copulo (UCal); Cave Creek, VII-4-30, J. O. Martin, 1 paratype (CAS). Huachuca Mts., W. side, Sunnyside Cn., 6000 ft., VIII-4-52, Leech & Green, 2 paratypes (CAS). Baboquivari Mts., E. side, Brown Cn., Pima County, VII-29-52, Leech & Green, 1 paratype (CAS). Tumaacacori Mts., Yanks Spring, Sycamore Cn., Santa Cruz County, VIII-3-52, Leech & Green, 2 paratypes (CAS).

MEXICO.—COAHUILA. 15 mi. N. of Saltillo, V-24-52, Cazier et al., 1 paratype (AMNH). TAMAULIPAS. Liera, VII-19-54, U. Kans. Mex. Exped., 2 paratypes (UKans). S. L. POTOSI. Tamazunchale, XII-20-48, E. S. Ross, 1 paratype (CAS); Palitla, 5 mi. N. of Tamazunchale, XII-22-48, H. B. Leech, 1 paratype (CAS). MORELOS. Cuernavaca, VI, A. Fenyes collection, 2 paratypes (CAS).

(3) *Pyropyga cordobana* Green, NEW SPECIES

HOLOTYPE.—MALE. Cordoba, Vera Cruz, Mexico, Dr. A. Fenyes. In collection of California Academy of Sciences.

Body black, pronotum pale with median vitta. Genitalia as in figure 3; inner processes present; viewed dorsally, median lobe narrower as compared with *P. nigricans*, with basal angles strongly obtuse; median lobe extending beyond tips of outer processes; viewed laterally, outer processes with upper margin subrectilinear as compared to arcuate in *P. modesta*. Length 7.5 mm.

VARIATIONS.—Viewed laterally, the tip of the lateral lobe may be slightly produced downward, somewhat in the manner of *P. modesta*. Length 5.25-7.5 mm.

DISTRIBUTION.—MEXICO.—VERA CRUZ. Cordoba, Dr. A. Fenyés, holotype, 6 paratypes (CAS). Orizaba, 2500 ft., II-13-54, R. R. Dreisbach, 1 paratype (CAS). S. L. POTOSI. 5 mi. N. of Tamazunchale, XII-22-48, E. S. Ross, 1 paratype (CAS). CHIAPAS. San Carlos, 10 mi. S., III-11-53, R. C. Bechtel & E. I. Schlinger, 2 paratypes, 1 female (UCal); 5 mi. S., III-6-53, Ray F. Smith, 1 paratype (UCal). Ocosingo, 4 mi. NW., III-9-53, Bechtel & Schlinger, 3 paratypes (UCal). Soyaló, 4 mi. SE., III-1-53, Bechtel & Schlinger, 2 paratypes (UCal).

(4) *Pyropyga australis* Green, NEW SPECIES

HOLOTYPE.—MALE. Tabillas, Salta, Argentina, G. L. Harrington. In collection of California Academy of Sciences.

Body dark piceous, probably somewhat teneral, pronotum pale with median vitta incomplete, not attaining base or apex. Genitalia as in figure 4, inner processes present; viewed laterally, lateral lobes each with tip greatly produced and nearly meeting tip of inner process. Length 5.25 mm.

VARIATIONS.—Except in the holotype, the color of the body is more nearly black. The pronotal vitta is abbreviated or indistinct in front, but usually attains the base or nearly so. Length 4.25-5.25 mm.

DISTRIBUTION.—ARGENTINA.—Tabillas, Salta, G. L. Harrington, holotype, 1 female (CAS). Crest ridge NW. of Tucuman, II-11-51, Ross & Michelbacher, 1 paratype, 3 females (CAS).

(5) *Pyropyga extensa* Green, NEW SPECIES

HOLOTYPE.—MALE. Jalapa, Mexico, May, A. Fenyés. In collection of California Academy of Sciences.

Body black, pronotum pale with median vitta. Genitalia as in figure 5, inner processes present; viewed laterally, median lobe broad, not arcuately deflexed; viewed dorsally, lateral lobes diverging from base of median lobe; inner processes visible ventrally as in *P. nigricans*. Apparently related to *P. minuta* in the general structure of the genitalia, but differing greatly therefrom in the broad nondeflexed median lobe. A small denticle occurs on the inner face of each outer process near the lower margin. This is not present in *P. minuta*. Length 5 mm.

DISTRIBUTION.—MEXICO.—The holotype and a paratype, both from Jalapa, Vera Cruz, are the only known representatives of this species. The paratype is in the collection of the American Museum of Natural History, and was collected by J. & D. Pallister, V-22-46.

(6) *Pyropyga minuta* (LeConte)

Ellychnia minuta LeConte, 1851, Acad. Nat. Sci. Philadelphia, Proc., (2) 5: 333.

Body black, pronotum pale with median vitta subparallel-sided, usually somewhat expanded near base. Genitalia as in figure 6, inner processes present, not visible from direct ventral viewpoint except sometimes the extreme tips; viewed laterally, median lobe arcuately deflexed between outer processes; viewed dorsally, lateral lobes usually diverging from base of median lobe; viewed laterally, outer processes variable in shape as shown in figure 6. Length 3-5.5 mm.

This is the smallest species of the genus, and is usually but not always narrowly elongate. Similar narrow specimens occur in other species, so the character is not dependable for identification. Genitalic variability is extreme, indicating a possible species complex, although nothing definite could be established from the abundant material available.

DISTRIBUTION.—UNITED STATES.—NORTH CAROLINA: Raleigh. FLORIDA: Tampa; Crystal River; Inverness. LOUISIANA: New Orleans. MISSOURI: Roaring River State Park; Ranken. KANSAS: Mt. Hope; Wichita; Gove County; Meade County. OKLAHOMA: El Reno; Stillwater. TEXAS: Dallas; Brownsville; San Antonio; Cameron County; Val Verde County; Kinney County; Hidalgo; Karnes County. COLORADO: La Junta. NEW MEXICO: Jemez Mts.; Bernalillo; Tarrant County. ARIZONA: Patagonia.

MEXICO.—NUEVO LEON: Carcado. S. L. POTOSI: San Luis Potosi. DURANGO: Registro. VERA CRUZ: Cordoba. PUEBLA: Atlixco; Puebla. MORELOS: Cuernavaca; Las Estacas.

HONDURAS.—Brus Lagoon.

(7) *Pyropyga alticola* Green, NEW SPECIES

HOLOTYPE.—MALE. San Cristobal 1. Casas, IV-27-59, 7500 ft., H. E. Evans. In collection of Cornell University.

Body black, pronotum pale with median vitta broadly attaining apex and base, subparabolic, covering all of convex surface except a very narrow strip each side. Genitalia as in figure 7, similar in structure to *P. minuta*, more densely sclerotized. Length 6.5 mm.

VARIATIONS.—Nothing of importance noted. Length 6-7 mm.

DISTRIBUTION.—MEXICO.—CHIAPAS. San Cristobal de las Casas: IV-27-59 to V-1-59, 7500 ft., H. E. Evans, holotype, 2 females (CU), paratype (CAS); VII-10-55, 7000 ft., P. & C. Vaurie, 2 paratypes (AMNH). MEXICO. Atlacomulco, VIII-18-54, 8100 ft., Univ. Kans. Mex. Expedition, 1 paratype (UKans).

(8) *Pyropyga incognita* E. Olivier

Pyropyga incognita E. Olivier, 1912, Revue sci. du Bourbonnaise, 25:21.

Body black, pronotum pale with median vitta. Genitalia as in figure 8, inner processes lacking; viewed dorsally, tips of lateral lobes not separated by median lobe but united above it. Length 4-4.5 mm.

DISTRIBUTION.—BRITISH WEST INDIES.—St. Vincent, Kingston, III-29-27 (CU). Also recorded by Leng and Mutchler from Dominica and various localities on the island of Grenada.

VENEZUELA.—Ciudad Bolivar, VII and XI, 1898, E. A. Klages (CU, CAS).

(9) *Pyropyga decipiens* (Harris)

Lampyris decipiens Harris, 1836, Nat. Hist. Soc. of Hartford, Trans., 1: 74.

Body black, pronotum variable in color pattern. Genitalia as in figure 9, inner processes lacking; viewed ventrally, outer processes abruptly narrowed at about basal two-fifths, the angle formed by the constriction somewhat deflexed. Length 4.5-7.25 mm.

The pronotum may be pale with only the median vitta dark, or it may have in addition narrow obscurely darker borders. In the latter case the resemblance to *P. nigricans* may cause some uncertainty in identification unless the genitalia are examined. The median vitta may become quite wide, covering all, or nearly all, of the convex surface. Sometimes a combination of wider vitta and darker borders results in the complete elimination of pale lateral areas. These various color patterns intergrade and do not permit a definite segregation of color phases. In the female the terminal ventral segment is broadly, very feebly, arcuately emarginate, as compared to angulately notched in *P. nigricans*.

DISTRIBUTION.—Southeastern Canada and northeastern United States. Quebec and Ontario south to North Carolina and Tennessee. The western limits cannot be given from the available material. A single male from Broken Bow, Oklahoma, is at hand but may be mislabeled.

(10) *Pyropyga saltensis* Green, NEW SPECIES

HOLOTYPE.—MALE. Salta, Argentina, II-14-51, Ross & Michelbacher. In collection of California Academy of Sciences.

Body black, pronotum pale with median vitta indistinct apically. Genitalia as in figure 10, inner processes lacking. Length 4.5 mm.

DISTRIBUTION.—ARGENTINA.—Salta, II-14-51, Ross & Michelbacher, holotype, 1 paratype (CAS).

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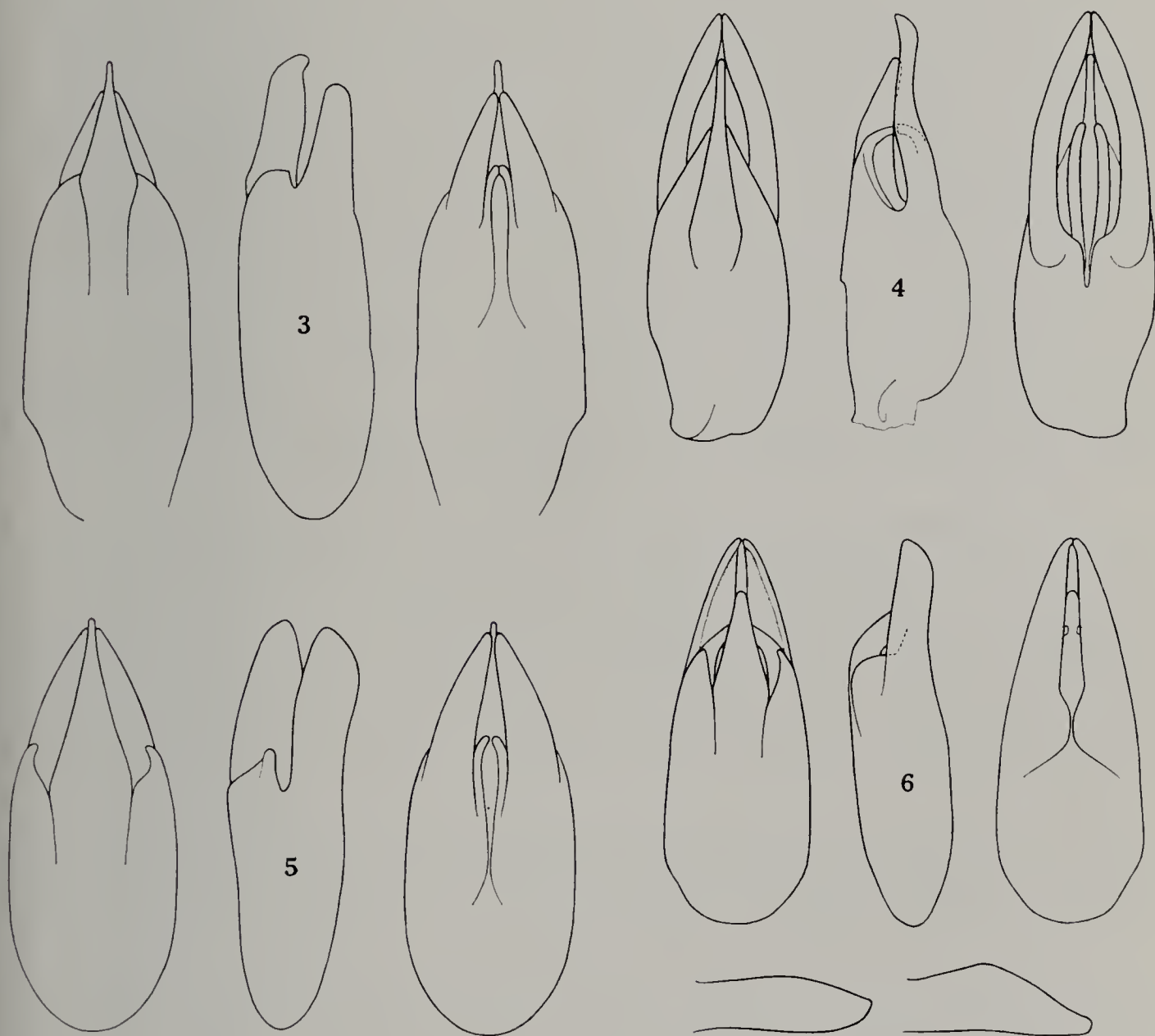
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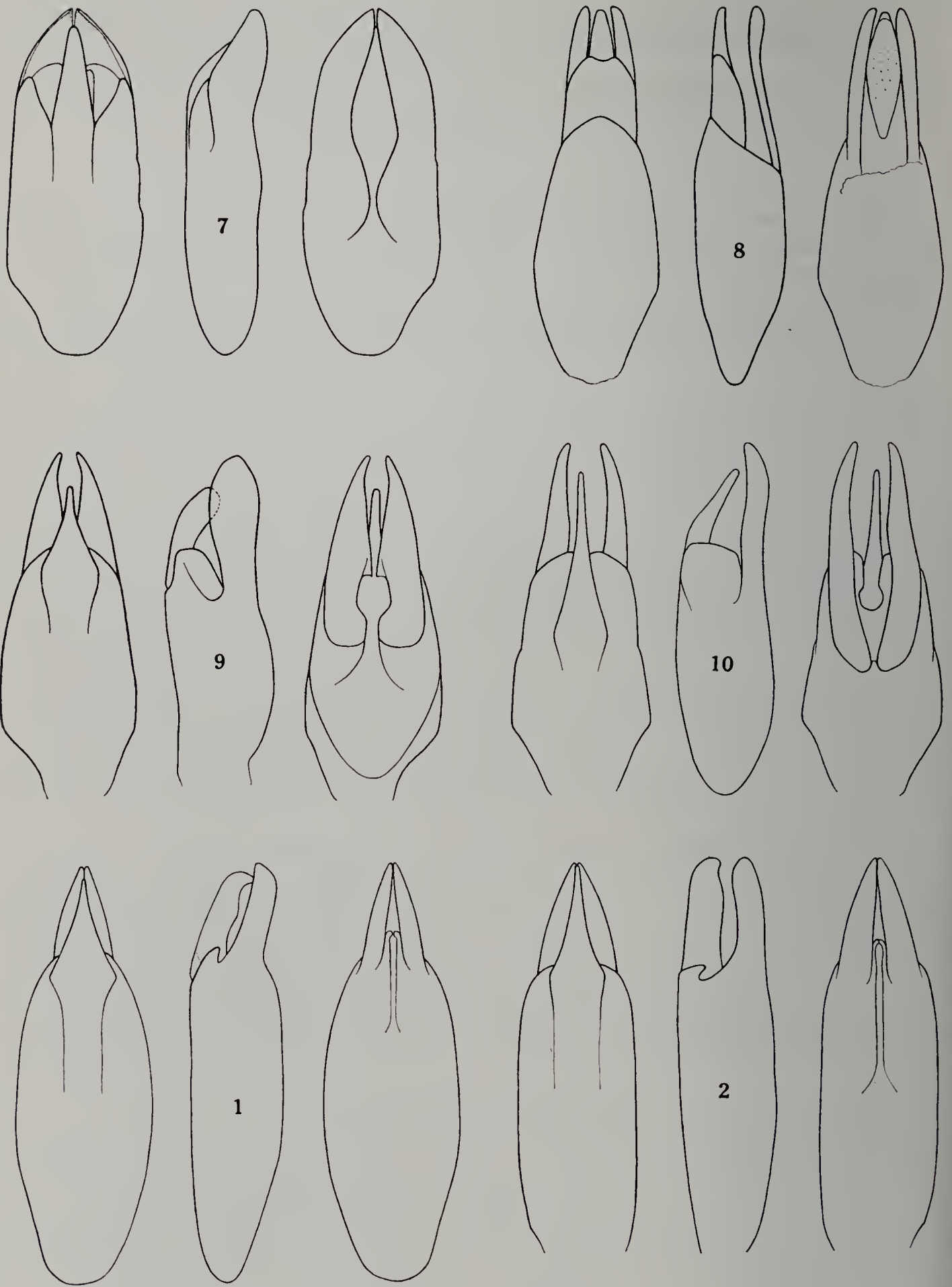
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Male genitalia of *Pyropyga* species; dorsal, lateral, and ventral aspects arranged from left to right. FIG. 1, *P. nigricans* Say, Corpus Christi, Texas, IV-28-42, E. S. Ross (CAS); FIG. 2, *P. modesta* Green, new species, holotype; FIG. 3, *P. cordobana* Green, new species, holotype; FIG. 4, *P. australis* Green, new species, holotype; FIG. 5, *P. extensa* Green, new species, holotype; FIG. 6, *P. minuta* LeConte, with variations of outer processes, Inverness, Florida, Citrus County, V-23-43, B. Malkin (CAS).



Male genitalia of *Pyropyga* species; dorsal, lateral, and ventral aspects arranged from left to right. FIG. 7, *alticola* Green, new species, holotype; FIG. 8, *P. incognita* E. Olivier, Kingstown, St. Vincent, B.W.I., III-29-1947 (CU); FIG. 9, *P. decipiens* Harris, Wind Gap, Pa., VII-2-30, J. W. Green (CAS); FIG. 10, *P. saltensis* Green, new species, holotype.